

coefficient of linear expansion closer to that of the board

4. If the loadings of the inorganic filler 6f is determined from this point of view, then, as indicated by the solid line in Fig. 33F, the amount of the inorganic

5 filler is mixed less in the order of a portion located in
the vicinity of the IC chip 1, a portion located in the
vicinity of the board 4, and a middle portion located
between the vicinity of the IC chip 1 and the vicinity of

10 linear expansion of the portion brought in contact with the
IC chip 1 comes close to that of the IC chip 1. Therefore,
both the members are hard to separate, and since the
coefficient of linear expansion of the portion brought in
contact with the board 4 comes close to that of the board 4,
15 both the members are hard to separate.

In any one of the cases of Fig. 33A through 33F, it is practically preferable to set the amount of the inorganic filler within a range of 5 to 90 wt%. When the ratio is lower than 5 wt%, the mixture of the inorganic filler 6f is meaningless. When the ratio exceeds 90 wt%, the adhesive strength is extremely reduced, and it is difficult to form a sheet, leading to a disadvantage.

When the IC chip 1 is thermocompression bonded to the board 4 employing a film of a multilayer structure constructed of the plurality of resin layers 6x and 6y or

resin layers 6x, 6y, and 6z as described above as an anisotropic conductive layer, the insulating resin 6m is softened and melted by heat at the time of bonding, causing the mixture of the resin layers. Therefore, finally, the definite boundaries between the resin layers disappear, and the inclined inorganic filler distributions as shown in Fig. 33 result.

Furthermore, in the fourteenth embodiment or the modification examples, it is also possible to employ different insulating resins for anisotropic conductive layer that has a portion or layer including the inorganic filler 6f or the anisotropic conductive layer in which the inorganic filler distribution is inclined, according to the portion or the resin layer. For example, it is also possible to employ an insulating resin that improves the adhesion to the film material to be used on the IC chip surface for the portion or the resin layer brought in contact with the IC chip 1 and employ an insulating resin that improves the adhesion to the material of the board surface for the portion or the resin layer brought in contact with the board 4.

According to the fourteenth embodiment and the various modification examples thereof, no or a smaller amount of inorganic filler 6f exists in the bonding interface of the IC chip 1 or the board 4 and the

anisotropic conductive layer 10, and the innate adhesion of the insulating resin is effected. This increases the insulating resin of high adhesion in the bonding interface, allowing the adhesion strength of the IC chip 1 or the board 4 and the insulating resin 6m and improving the adhesion to the IC chip 1 or the board 4. With this arrangement, the operating life is improved during a variety of reliability tests, and the peel strength to bending is improved.

If an inorganic filler 6f, which does not contribute to the bonding itself but has the effect of reducing the coefficient of linear expansion, is uniformly distributed in the insulating resin 6m, then the inorganic filler 6f comes in contact with the surface of the board 4 or the IC chip. This leads to a reduction in the amount of adhesive contributing to the bonding and to degraded adhesion. As a result, if the separation between the IC chip 1 or the board 4 and the adhesive occurs, moisture enters the portion, causing the corrosion of the electrode of IC chip 1 or the like. If the separation progresses from the separated portion, then the very bonding of the IC chip 1 to the board 4 becomes defective, causing a defective electrical connection.

In contrast to this, according to the fourteenth embodiment and the various modification examples thereof as

TOPAZ035006860